BARNES NURSERY

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OHIO EPA
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Barnes

Ms. Laura A. Fay
Section 401 Coordinator
Ohio Environmental Protection Agency
P.O. Box 1049
Columbus, OH 43216-1049

July 24, 2001

RE: Response to information request: Barnes Nursery, Inc. 401 Application No. 2000-02170(1)

Dear Ms. Fay:

This letter is in response to your communication of July 3, 2001 regarding our application for a 401 Water Quality Certification. We have attempted to respond to all of your inquiries. In doing so we have numbered each of the paragraphs in your letter in order that you can easily track our responses.

¶ 1. Project Review

The following information is being provided at your request in order to complete your review of our project application.

¶ 2. Clarification of Project Location

You state "This is an after-the-fact application for dredging and filling in vegetated and unvegetated areas of Sheldon Marsh, and a Category 3 barrier-lagoon coastal wetland complex." This statement is inaccurate for several reasons. First, the application is not simply for an after-the-fact activity, more precisely the application is for modifications and additions to a partially completed project. Second, the project is located in East Sandusky Bay, not Sheldon Marsh. Sheldon Marsh is an informal name (formerly known as Sheldon's Folly) applied to a marshy area adjacent to the NASA causeway at the far eastern end of East Sandusky Bay. Third, the application does not include any dredging and filling in vegetated areas—therefore our project (existing and proposed) did not, nor will not, occupy any wetland areas.

Sheldon Marsh State Nature Preserve includes over 100 acres of unvegetated, open-water environment in East Sandusky Bay. Our proposed project lies adjacent to the open-water portion of the nature preserve.

¶ 3. Wetlands and Mud Flat Clarification

We disagree with your statement that the project, as proposed in our application, occurs on "vegetated areas as well as unvegetated mudflat areas." The footprint of the project, as it now exists and with its proposed modifications, lies in an open-water area of East Sandusky Bay which when built lacked any wetland vegetation.

To resolve the question of wetlands *verses* mud flats *verses* open water environment, we have taken average water level conditions to be typical of the site. Under these conditions the project area is submerged. No emergent, submersed, or floating-leafed aquatic plants are present. The long-term mean water level of Sandusky Bay as recorded at the ODNR, Division of Geological Survey gaging station in Sandusky is +2.2 feet above low water datum (LWD) or elevation 571.4 feet (IGLD, 1985). For reference, the water level during the agency site visit (May 22, 2001 at 2:00 PM) was +2.1 feet LWD (elevation 571.3 feet) very close to the mean or normal water level in East Sandusky Bay. The general elevation of the flat-lying bottom of East Sandusky Bay is +1.5 feet LWD and about +1.6 feet LWD at the project site. This indicates that under normal (mean) conditions, the water depths at the project site prior to construction were at least 0.6 foot. Based on these data, our position is that the project area constitutes an open-water environment. The mud flat in East Sandusky Bay that has periodically appeared in recent years is the result of abnormally low lake levels and should not be taken as typical or normal conditions. Because the project was constructed in an open water environment, we do not believe that further wetland or mud flat restoration/mitigation efforts are appropriate for this project.

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Federal Manual for Identifying and Delineating Jurisdictional Wetlands, jointly developed by USFWS, USEPA, USACOE, and USSCS in 1989, states "Wetlands possess three essential characateristics: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology, which is the driving force creating all wetalnds." These are mandatory technical criteria and "must all be met for an area to be identified as a wetland." Because no hydrophytic plants were present on the bottom of East Sandusky Bay where construction has taken place or in the area proposed in our 401 Water Quality Certification application, the project site can not be considered a jurisdictional wetland.

¶ 4. Demonstrations

You have asked that we demonstrate the following: (1) wetland's designated use is maintained and protected, (2) no practicable alternative for irrigation project, (3) appropriate and practicable steps to minimize potential adverse impacts, (4) proposed activity is necessary to meet a demonstrated public need, (5) project is necessary to accommodate important social & economic development, (6) storm water and water quality controls will be installed, (7) project will cause only short-term disturbance of water quality, and (8) mitigation of wetlands. You further elaborate on the need for demonstrations for items 2 through 5, 7, and 8 in several subsections of ¶ 5. Our demonstrations for these six points are contained in Section 5.2.e. through 5.2.j. The other two demonstrations (items 1 and 6) are presented herein.

Demonstration 1. Wetland's designated use is maintained and protected

The coastal wetlands of East Sandusky Bay, including Sheldon Marsh and the southern shoreline of the bay perform important environmental functions and therefore are of considerable resource value to the region. These wetlands support highly productive, diverse biotic communities which interface between the aquatic environments of the open lake and small upland tributaries, as well as adjacent terrestrial environments. A prominent feature is their diverse wetland vegetation which provides cover and food for wetland-associated animals. Because these plants slow the flow of water through the wetlands, they are important in erosion and sediment control by reducing the erosive effects of currents, by trapping sediments before they reach the open lake, and by attenuating lake-generated waves that enter the bay. The same vegetation provides a natural pollution abatement mechanism by filtering and absorbing excess nutrients and toxic substances, thereby reducing the loading of these materials to the lake. The proposed project will enhance, not detract, these important wetland functions and values. Specific features and uses of the East Sandusky Bay wetlands are outlined below.

Fish Habitat. Coastal wetlands are important sources of nutrition for commercial, sport, and forage fisheries living in the bay and Lake Erie. Emergent wetland plant communities of such wetlands are among the most botanically productive areas on earth, rivaling salt marshes, tropical rain forests, and intensively cultivated areas. The net primary productivity of these plants range from 3,000 to 8,500 g/m^2/yr (Westlake, D. F. 1963 *Comparison of Plant Productivity*. Biol. Rev. 38:385-425). When wetland plants die, bacteria and fungi transform plant tissues into fragments of food and vitamin-rich detritus which are carried into the estuary basin and open waters of the lake, where many fish and invertebrate species are dependent on this debris. In addition, coastal wetlands provide protected nursery grounds for young-of-the-year (YOY) fish. R. E. Thibault (1985 *Fish Recruitment and Secondary Production in Old Woman Creek Estuary, Huron, Ohio*. Final research report submitted to Sanctuary Programs Div.-NOAA/NOS and ODNR, Div. Natural Areas and Preserves, Columbus, OH, 19 pp.) observed YOY and juvenile Lake Erie fish species in nearby, and analogous, Old Woman Creek estuary and concluded that these fishes episodically reproduce in the estuary and use it for a nursery ground. W. S. Hoffman (1985 *The Fishes of Old Woman Creek Estuary*. Old Woman Creek State Nature Preserve and National Estuarine Research Reserve Tech. Report No. 4. ODNR, Div. Natural Areas and Preserves, Columbus, OH, 24 pp.) noted that the diversity and large numbers of these fish reflect the importance of the estuary as a spawning and nursery area for lake species. Restoring the natural hydrology to a portion of the bay will create new wetlands and insure viable fish habitats during low water episodes.

Waterfowl and Other Wildlife Habitat. Coastal wetlands provide essential breeding, nesting, feeding, and predator escape habitats for many forms of waterfowl, other birds, mammals, reptiles, amphibians, and invertebrate animals. The land-water interface of these wetlands, including upland buffer areas, is among the richest wildlife habitats in the world (Kusler, J. A. 1983 *Our National Wetland Heritage*. Environmental Law Institute, Washington, DC, 168 pp.). This diversity and concentration of wildlife is a result of: (1) ample water which is needed by all life forms, (2) abundant and diverse vegetation which serves as a basis of food chains, and (3) adequate cover provided by aquatic, wetland, and shore vegetation. Coastal wetlands also provide habitat for many threatened and endangered plant and animal species.

Harvestable Resources. Because of their high natural productivity, coastal wetlands have unrealized food production potential for harvesting marsh vegetation and for aquaculture. Kusler (1983) reported that *Typha* spp. (cattails) hold an enormous potential for production of protein; one hectare can yield up to 60 tons of cattail biomass and produce 14 tons of cattail flour. Forested wetlands are an important source of timber despite the physical problems of removing felled trees from swamps. Seedlings of cottonwood and willow are appearing on the island at our project site. Aquaculture for fishes such as *Cyprinus* (carps) and *Ictalurus* (catfishes) is promising in freshwater marshes. Although mink, otter, weasel, and skunk are occasionally taken from Great Lakes coastal wetlands, the main furbearers in terms of total pelt value are muskrat and raccoon. Muskrat densities and pelt qualities are highest in cattail marshes, while raccoons commonly inhabit wooded bottomlands near waterways (Herdendorf, C. E. et al. 1981 *Fish and Wildlife Resources of the Great Lakes Coastal Wetlands within the United States*. U.S. Fish and Wildlife Service, FWS/OBS-81/02 — V1: Overview). However, numerous mink dens have been noted near the crest of the our newly-created island which parallels the hydrologic channel.

Flood Conveyance and Storage. Floodplain formation is a process which takes place during floods to create a natural conveyance configuration for flood waters and sediment. Coastal wetlands, tributary floodplains, and channels (such as the Black Channel) form natural floodways that convey flood waters from upstream tributaries to Sandusky Bay and the open lake, thereby reducing the inundation of upstream areas. East Sandusky Bay can store water during times of flood and release it slowly to the open lake. Our deep-water channel can facilitate these important functions.

Barrier to Waves and Erosion. Barrier beaches and wetlands reduce the impact of storm waves and wind tides before they reach upland areas. Waves break on the sandy beaches and wetland plants attenuate wave height, dissipating much of the waves' energy. Many emergent wetland plants found in East Sandusky Bay, such as *Scirpus* (bulrushes) and *Typha* (cattails), have interconnected root systems. Their roots and thick rhizomes form gird-like mats which bind and protect coastal soils against erosion. Extensive growths of emergent wetland plants have already been noted on the bay bottom south of our project.

Sediment and Pollution Control. Coastal wetland vegetation reduces flood flows and the velocity of flood waters, lessening erosion and causing sediment-laden waters to release their load. Wetlands plants filter and hold sediment that would otherwise enter the bay and lake causing siltation problems and habitat destruction. In addition to sediment, coastal wetlands also protect water bodies from nutrients and other natural and anthropogenic pollutants. While macrophytic vegetation filters sediment, organic matter, and chemicals, micro-organisms utilize dissolved nutrients and decompose organic compounds. R. T. Heath (1986 *Phosphorus Dynamics in the Old Woman Creek National Estuarine Sanctuary – A Preliminary Investigation.* Final research report submitted to Sanctuary Programs Div.-NOAA/NOS and ODNR, Div. Natural Areas and Preserves, Columbus, OH, 105 pp.) determined that water leaving Old Woman Creek estuary had a 77% lower concentration of soluble reactive phosphorus than water entering the estuary, while D. M. Klarer (1988 *The Role of a Freshwater Estuary in Mitigating Storm Water Inflow*. Old Woman Creek State Nature Preserve and National Estuarine Research Reserve Tech. Report No. 5. ODNR, Div. Natural Areas and Preserves, Columbus, OH, 54 pp.) found that nitrate concentrations were reduced by 42%. More recently, K. A. Krieger (2001 *Effectiveness of a Coastal Wetland in Reducing the Movement of Agricultural Pollutants into Lake Erie*. Old Woman Creek State Nature Preserve and National Estuarine Research Reserve Tech. Report No. 15. ODNR, Div. Natural Areas and Preserves, Columbus, OH, 33 pp.) found that most of the inorganic particles settle out in the wetlands at the mouth of Old Woman Creek, resulting in a significant retention of total phosphorus (34%). Similar retention of excess nutrients can be expected in the new marshes of East Sandusky Bay that are developing south of the our channel as a direct result of the protection provided by our project.

Water Supply and Groundwater Recharge. Coastal marshes are potentially important sources of surface water and groundwater, particularly with the growth of urban centers and dwindling water supplies. Wetlands are effective in storing and purifying surface waters and they serve as recharge sources for groundwater. The groundwater recharge capacity of coastal embayments is well documented and is one of the important values and functions of wetlands. Our hydrologic channel runs along the edge of coastal wetlands and thereby serves as a source of ground water for the adjacent wetlands. These wetlands benefit from the existence of the channel, particularly during dry, low-water periods. Water from our channel percolates laterally and saturates the soils beneath the adjacent coastal wetlands. Saturation of the root systems of wetland plants is essential for obligate species.

Historical and Archaeological Values. Coastal wetlands are of historical and archaeological interest. American Indians and European-stock pioneers frequently selected coastal areas near wetlands for settlement because of the abundant wildlife, fish, and shellfish which they contained and the boat harbors which they afforded. The Sandusky Bay area is rich with prehistory sites. Archaeological excavations reveal that peoples of the Palaeo-Indians (8,000 to 7,000 BC), Archaic (7,000 to 1,000 BC), and Woodland (1,000 BC to AD 1,600) cultures occupied the region and utilized its resources (M. P. Otto 1980 *Ohio's Prehistoric Peoples*. Ohio Historical Society, Columbus, OH, 75 pp.).

Ohio State Archaeological Site 33-ER-436 is located in the vicinity of our project, at the edge of a farm field south of the channel. The site produced a single artifact — a slate, notched, butterfly bannerstone. The artifact was recovered during a survey of the site in September 1986. A preliminary documentation form for the site, prepared by Mr. Eugene Edwards and Dr. Jonathan E. Bowen, was received by the Ohio Historic Preservation Office on May 25, 1994. At the request of Barnes Nursery, Mr. Edwards reexamined the site and conducted a survey of our island and surrounding area during June 2001. A report of his findings was submitted to the Ohio Historic Preservation Office on June 29, 2001.

In summary, Mr. Edward's survey of the island and environs yielded no specific artifacts, only a few pieces of broken flint. No artifacts other than the bannerstone have been found at site 33-ER-436, although Mr. Edwards has surveyed the site on several occasions. He concluded that our project does not adversely impact site 33-ER-436 or any other archaeological site. He believes that the construction of our project may help protect site 33-ER-436 from destruction by the rapidly receding south shore of Sandusky Bay.

Recreation, Open Space, and Aesthetic Values. Recreational fishing and waterfowl hunting are popular leisure-time pursuits in freshwater wetlands and coastal marshes. Many sport and commercial species of fish and most waterfowl depend on these wetlands as sources of food and as spawning, breeding, and nesting areas. Even more popular is the recreational use of these areas for observing birds and wildlife with binoculars and cameras. Coastal wetlands are areas of great diversity and beauty, providing open-spaces for recreational and visual enjoyment. Lands adjacent to scenic estuaries are often considered high-value real estate. Once completed and natural vegetation has been established, our project will harmonize with the surrounding area and will be aesthetically attractive.

Education and Research Values. Coastal wetlands provide educational opportunities for nature observation and scientific study. Our project site has been offered as a field laboratory where scientists can study naturally-functioning systems and can evaluate the effectiveness of our restoration efforts. It can also serve as a place where students and interested citizens can learn about wetland ecology. As a transition zone between land and water, the site will contains a variety of habitats including woodlots, marshes, deep water channel, islands, open waters of the bay, small tributary streams, barrier beach, and nearshore Lake Erie.

Demonstration 6. Storm water and water quality controls will be installed

The entire container and "balled & burlaped" areas of our nusery are underlain with porous crushed rock and a tile system that carries irrigation water and storm water back to the intake channel adjacent to the pump station for recycling. This system is currently providing adequate storm water control. No additives are placed in the irrigation water and no chemicals are applied to the plants in the above-ground irrigation fields. A rock-filled weir, which serves to filler debris and bar fish from entering the pumping area, is located near the northern end of the intake channel

Barnes Nursery has requested Corps of Engineers authorization to conduct interim remedial actions to reduce surface erosion on our side cast island and control sedimentation to East Sandusky Bay. We have noted gullies on the side slopes of the island and some turbidity in the hydrologic channel. We are proposing the following actions in this regard:

1. Grade the sides of the island, particularly on the channel side where the most severe gullies occur, to a gentle slope. This will be accomplished by a combination of hand labor and small mechanical equipment.
2. Extensive portions of the island are currently vegetated with dense patches of smartweed (*Polygonum* spp.), especially areas where dark soil patches correspond to former feeder tributaries of the Black Channel. These areas are well protected by this vegetation and therefore will not be disturbed.

3. Seed the currently non-vegetated portion of the island with a native ground cover such as panic grass (*Panicum* spp.) or perennial rye grass.
4. Place berms of compost at the top and bottom of the island's slopes to slow the velocity of run-off water and provide sediment loading protection to the channel and adjacent East Sandusky Bay. The application is recommended by USEPA in document EPA530-F-97-043 (October 1997).

¶ 5. Specific Comments and Citizens Suit Provision of Clean Water Act

Our attorney, Mr. Steven D. Bell, has communicated to you our concerns regarding your statements in this paragraph. We would like you to explain with particularity what "violations of the state and federal law" have allegedly been committed by Barnes Nursery. Could you also explain how the State of Ohio believes it can file a citizen suit against Barnes Nursery under the Clean Water Act? We are very concerned that there is now in the public record a letter alleging that "violations of the state and federal law" have been committed by Barnes Nursery. We believe that we should have every opportunity to respond to these very serious allegations. We are unable to frame a response without first receiving from the State of Ohio specific information concerning the factual basis for the serious accusations made in your letter. As we assume that the State of Ohio has already determined that these "violations of the state and federal law" occurred, we would appreciate receiving from you a description of the factual basis for such a claim.

5.1. Section 11: Applicant signature and date

The accompanying REVISED APPLICATION FOR OHIO EPA SECTION 401 WATER QUALITY CERTIFICATION is properly signed and dated by the applicant.

5.2. Applicant's alternatives

5.2.a. Preferred alternative

You state, "Because this is an after-the-fact application, the preferred alternative should be as the project was constructed." This is not accurate. In negotiation with the Corps of Engineers following the suspension of our Nationwide 27 permit, it was agreed that our Individual permit application could include modifications to the project as constructed when work was suspended in July 2000 (personal communication: Michael G. Montone, USACOE, Buffalo District Office, January 30, 2001). Thus, our preferred alternative was the after-the-fact with modification application that was transmitted to the Corps of Engineers on March 13, 2001. The preferred alternative in our Section 401 Water Quality Application therefore reflects this understanding, as is contained in our Corps of Engineers application No. 2000-02170(1). Specifically, the proposed modifications to our existing construction work include:

1. grade the island to a relatively uniform elevation about 6 feet high,
2. modify the single island into 5 separate islands by cutting circulation channels approximately every 300 feet, which will result in 6 water passages through the archipelago,
3. grade the side slopes of the islands to a 4-to-1 slope (run to rise) to foster wetland plant zonation, and
4. excavate a narrow, feeder channel (500 feet long, 2 to 3 feet wide, and 1 to 2 feet deep) by pulling a steel sediment plow between the natural channel and the existing hydrologic channel.

5.2.b. Non degradation alternative

We disagree with your statement that the non degradation alternative "would entail restoring the site to pre-construction conditions." Filling in the existing hydrologic channel would not only eliminate an essential water source for our nursery, but exacerbate an already critical water shortage situation in East Sandusky Bay. Our project site is well on the way to stabilizing conditions along the south shore of the bay. Wetland plants are beginning to spread across the once barren embayments of this shore. During the many days in which East Sandusky Bay was dry this spring, our hydrologic channel furnished the only refugia for fish, amphibian, reptilian, and avian species. To destroy this channel and remove the protective island would certainly cause more adverse environmental impact than to let them exist and function to enhance wildlife habitat on our property and the surrounding area. Thus, our position is that because no degradation can be demonstrated from our project as it now exists, its present configuration would constitute a non degradation alternative.

You state that this alternative should include "securing additional water supply through completely upland alternatives" and "constructing an above or below ground pipeline through upland areas, directional boring, obtaining county water during periods when there is insufficient water in the marsh [we do not pump water from the marsh]...as well as instituting water conservation measures, equipment, etc. to reduce the amount of water needed." All of these options have been explored in depth and are discussed below under 5.2.e. No practicable alternative for irrigation project, and 5.5. Public water supply (subsections a-g). We have found none of these approaches to be physically practical or economically feasible to supply our water needs.

5.2.c. Minimal degradation alternative

We believe that certain modifications to the project as it now exists will cause only minimal disturbance of the site, but will provide major environmental enhancements. Specifically, we would like to provide for the long-term stability of the island and further improve water circulation along the south shore of East Sandusky Bay by: (1) grading the existing island to a relatively uniform elevation about 6 feet high with a gentle side slope of 4-to-1 (run to rise) to foster wetland plant zonation, and (2) reconfigure the single existing island into 5 separate islands by cutting circulation channels approximately every 300 feet to form an archipelago with 6 water passages.

You state that this alternative should include "designs like buried pipelines, removal of the dike, etc." Removal of the island would expose the hydrologic channel to erosion and infilling by wave action in East Sandusky Bay and it would also eliminate the quiescent environment that is necessary for the stability of coastal marshes. Options such as a buried pipeline been explored and are discussed below under 5.2.e. No practicable alternative for irrigation project, and 5.5. Public water supply (subsections a-g). We have found this approach not to be physically practical or economically feasible to supply our water needs.

5.2.d. Mitigative technique alternative

You suggest mitigative techniques that include approaches such as "segment the dike into sections and other activities to minimize the actual and potential impacts of the project." As explained above in 5.2.a. Preferred alternative, our application to the Corps of Engineers, and therefore our 401 Water Quality Certification application, is not simply an after-the-fact application, but it was submitted with the understanding that modifications would be a part of our preferred design. Thus, the approaches you are suggesting are already embodied in our preferred alternative.

5.2.e. No practicable alternative for irrigation project

Nursery plants' enormous requirement for water is demonstrated by the fact that 300 to 500 pounds of water are necessary to produce one pound of dry organic matter (Haman, D. Z. 2001 *Principles of Irrigation Management: Water Management Guideline for Nursery/Floral Producers*. American Small Farm 10(7):22-24). Although water serves many functions in the plants, over 99% of the water absorbed is lost to the atmosphere. For a nursery-landscape operation, such as ours, that is producing and/or maintaining a variety of landscape plants, both deciduous and conifers, container grown and balled and burlapped (B&B), "overhead" irrigation is the industry's standard practice. Overhead sprinkler systems are the most effective way of broadcasting water to plants particularly when they are frequently moving in and out of a sales/holding area or growing beds.

The amount of water "running off" in an overhead type of system is dependent on many factors including: whether plants are B&B or container, soil type, size of plant head, and spacing of plants. Spacing is a critical factor to maintain good air circulation around plant material. Plants must be constantly monitored for spacing throughout their growing cycle. B&B plants need a growing medium to hold them upright (known in the industry as "healing in"). If wood chips are used, they absorb excess water. Barnes Nursery uses pea gravel, which holds moisture without absorbing water. Water percolates through the gravel downward to the return tile that leads to our intake channel. Other factors include wind, air temperature, water pressure, nozzle size, and setting. A nursery operation using good irrigation practices will also have numerous zones making it possible to modify frequency and length of water cycle depending on the particular situation of the block of plants in that particular zone.

Nurseries locate where adequate water resources are available. Commercial container growing operations and larger retail/wholesale nursery holding lots as a rule can not and do not buy potable water from public sources when they are employ overhead irrigation. Nurseries depend on both surface and/or groundwater sources in their particular location to provide the necessary water resources to maintain their inventories. Where operations depend on groundwater, they most frequently pump to a pond and irrigate from the pond. Dr. D. Z. Haman (2001) also points out that drainage ponds are not desirable sources of irrigation water because of the possibility of disease organisms and weed seed being distributed over the plants, and because of algae and other organisms developing which clog the irrigation system.

"Drip irrigation" is frequently used in field production, where trees and plants are grown in the ground. Small "spaghetti" lines run off a main trunk to each plant in a row. Water drips from the emitter to each individual plant. Of the 350 acres of our southern fields with "in ground" nursery stock, about 50% is under drip irrigation using potable county water. This method is not practical or cost effective for container and B&B stock.

Because we deal with perishable nursery stock, there is no such thing as a partial system for low water level events. In order to irrigate using an upland pipeline or purchase county water during such periods, the company would have to install a fully operable system to maintain the inventory—a quarter, third or half backup system would necessarily provide an adequate water supply in a low water emergency.

To demonstrate that less damaging upland alternatives are not available, and that no other practicable and cost effective measures have been found, we have prepared the following table which summarizes the cost and practicability of various options. These options are discussed in detail in 5.5.c. Groundwater wells and ponds, 5.5.e. County water, 5.5.f. NASA pumping station, and 5.5.g. Directional boring. The upland pipeline option is discussed below:

COMPARISON OF VARIOUS IRRIGATION WATER OPTIONS

Option	Costs of New Construction	Annual Maintenance	Annual Operating	Loan[1] Retirement	Adequate Water
Existing Pump & Channel	$12,000	$8,000[2]	$9,200	$12,700	YES
County Water	$420,000	0	$282,000	$40,600	YES
NASA Aqueduct	$500,000[3]	$10,000	$20,000	$48,300	YES
Directional Boring[4]	$1,000,000+	$15,000	$15,000	$96,600	YES
Upland Pipeline & Pump	$540,000[5]	$15,000	$10,000	$52,200	YES
Groundwater Wells & Ponds[6]	—	—	—		NO

Footnotes
1. Annual loan retirement (30 years)
2. Includes ecological monitoring
3. Includes estimated repairs to intake pipeline, pump renovation, and connection costs
4. Considered not to be technically and economically practicable
5. Includes estimated pipeline construction, intake and pump installation, and upland easements
6. Groundwater reserves not adequate to supply water needs

Upland Pipeline. Barnes Nursery has determined that an upland line would be anywhere from 5000' to 7200' depending on its placement across the "upland" area and considering the intake was at the Willow Drive bridge. Based on a 7000' pipeline we have determined:

1. a 12" diameter pipe would be required for moving the projected water needs of 1.4 million gallons per day this distance,
2. pipeline materials would be approximately $82,000,

3. cost of labor, equipment and materials (other than pipe) to dig and lay a pipe line underground has many unknowns; the degree of difficulty to lay a pipe along Willow Drive is complicated by the rip rap that would have to be either moved or bridged in order to maintain elevation in the installation; because of the weight of the pipe with water flowing through it, engineers have advised us that maintaining it above ground with anchors into the road bed through the rip rap would be technically difficult; this work is estimated at $260,000,
4. because water would not be flowing by gravity through this pipe, another pump would have to be installed and a water intake structure constructed at the Willow Drive bridge; this work is estimated at $68,000,
5. Cost of easements, estimated at $20 per foot, through adjoining upland (6,500 feet of commercially zoned) property would be $130,000.

Barnes Nursery considers this option not to be practicable for the following reasons:
1. costs: without considering the easement expense, the capital cost of $410,000 over 30 years at 9% interest would cost nearly $1.2 million; over 30 years an added cost of $39,600 per year,
2. technically difficult: unknowns regarding the pipeline installation are enumerated above (item 3); directional boring could be done if the degree of difficulty in placing the pipe on top of the rip rap along the Willow Drive would be too high; directional boring contractor advised us that it would be very difficult to bore underwater and install the pipe due to the stone reinforcement, road foundation most, and the narrow right-of-way (50 feet from road centerline),
3. maintenance: silt, sand, and organic debris (peaty material) would play havoc with the intake and cause perpetual clogging and extensive maintenance of the pumping system; access to the pump and intake for daily maintenance would be difficult.
4. experience of other facilities: communities in Erie and Ottawa counties that pump from the lake almost all use gravity to bring the water to their pump (rather than pumping uphill as our facility would require); even then these intakes get clogged and need continual maintenance.

5.2.f. Appropriate and practicable steps to minimize potential adverse impacts
Where our project site is located was formerly, and still is, open water adjacent to the south shore of East Sandusky Bay. The topography of the site was relatively flat, ranging from about 1.5 to 1.6 feet above Low Water Datum. The project originally cut into a low peninsula at its western end, disturbing about 130 linear feet of emergent wetland. As authorized by the Corps of Engineers, this intruded area was restored to its original topography in April 2001. The remainder of the existing project area (channel and parallel island about 1,500 feet long by 100 feet wide) lies on nonvegetated East Sandusky Bay bottom, as does the proposed 500-foot-long feeder channel. Because of the alternating submerged and dry conditions of this part of the bay in recent years due to abnormally low water levels, typical benthic invertebrates for East Sandusky Bay have likely been extirpated.

As pointed out in above in ¶ 4. Demonstration 6, Barnes Nursery has taken steps to minimize potential adverse impacts of the project by requesting Corps of Engineers authorization to conduct interim remedial actions to reduce surface erosion on the island and control sediment turbidity in the channel and bay. The proposed actions include:
1. grade the sides of the island, particularly on the channel side where the most severe gullies occur, to a gentle slope by using a combination of hand labor and small mechanical equipment,
2. preserve portions of the island that are currently vegetated with dense patches of smartweed, especially on areas with peaty, dark soil patches.
3. seed the currently non-vegetated portion of the island with a native ground cover such as panic grass or perennial rye grass, and
4. place berms of compost at the top and bottom of the island slopes to slow the velocity of run-off water and provide sediment loading protection to the channel and adjacent East Sandusky Bay as recommended by USEPA.

Approximately 5 acres of coastal wetlands will be created on former shallow, open-water bay bottom south of the hydrologic channel. The quiescent embayment afforded by our island is already fostering the spread of hydrophytic plants across the bottom. In addition, about 0.5 acre of aquatic vegetation will be encouraged on the side slopes of the hydrologic channel and the islands. Figure 12 of our application illustrates our concept of how the islands will appear once we have established native vegetation. As a comprehensive plant

nursery, Barnes Nursery, Inc. has the labor, equipment, plant stock, and access to appropriate technical resources to accomplish this task in a timely fashion.

5.2.g. Proposed activity is necessary to meet a demonstrated public need

Barnes Nursery is a privately held company operating its business for profit, for the benefit of its employees and owners, by providing goods and services to the general public. In working to accomplish this increasingly difficult task, Barnes pays taxes ($ 1.1million in 2000), and contributes goods, dollars and human resources to support the community and improve its quality of life for all. Will the State be better off with or without the project? If Barnes Nursery, its employees and owners are dispensable, and the "larger society of the State of Ohio" would be better served by forcing the company down because the "reasonably foreseeable detriments" (which Barnes Nursery disputes as pointed out elsewhere in this response) outweigh the proven good the company has contributed, then so be it.

However, we ask the public to...consider the 16,000 trees we plant each year in our nurseries, that eventually get planted and may be providing the shade you enjoy today. Consider the thousands of tons of yard debris and other organic waste Barnes Nursery has diverted from the local landfills over the past 10 years, accepted from the public and industry all over Ohio. Consider the thousands of landscaping and beautification projects that we have provided over the years to a public that has continuously supported our company. Consider the large work force that has provided cities timely emergency help after catastrophic storm events. Consider the futures of our many valued employees who have families and homes in the area.

Barnes Nursery is convinced that our hydrology restoration project will not only provide water to a growing and contributing company, but will provide benefits to the ecosystem. And, as Barnes has proved over the years to be a cutting edge company, there are greater gains to the larger society, tangible and intangible, to be realized by the continued success of this company. For example, the potential for our proposed new soil treatment center that will accept contaminated soils for bioremediation, rather than landfill disposing. With a strong Barnes Nursery the company will be able to continue research and development of new technologies to handle more and diverse organic material.

Society as a whole suffers from the loss of good jobs, quality services and important social contributions. There are many cases where there are no options, and society loses more fiber around which it is built. Here is a case that the loss of this business to society perpetrated on the potential detriments that this project may bring is ill advised. We believe this project will work in harmony with the marsh. We have addressed throughout this response that we strongly disagree that there are "reasonably foreseeable detriments" in such things as aesthetic changes (if the project were completed it would add aesthetically to the marsh); hydraulic alterations (they have already occurred by the washing out of the natural channels), invasive species (they are already in the marsh, although we have offered to monitor and control them if they are found to be a nuisance on our project), disruption of natural marsh development cycles, (which we do not believe our project will do. It will provide water in a channel when the rest of the marsh is dry.), and changes to natural faunal use and migration patterns (this project was designed to be assimilated into the natural environment not conflict or change it. We believe it will prove to be an asset to the State Nature Preserve.

5.2.h. Project is necessary to accommodate important social & economic development

Without an economical source of water, Barnes Nursery ***will not*** continue as the company it is today. Barnes Nursery's unique market niche and success as a horticultural operation has been dependent on our property on East Sandusky Bay for its reliable source of water. Landscape contracting and our retail garden center would be directly effected without access to water. Those two divisions made up 64% of our total sales in 2000. It is true certain aspects of our operation do not directly rely on water, for example, our tree service. But in a complex and integrated operation such as Barnes Nursery, a domino effect will begin to unravel the fiber of our business if we are forced to drastically alter our landscape contracting and retail businesses.

Over the years our location and its water source on East Sandusky Bay has allowed us to establish a self-sufficient operation. Because half of our work force is full time or

seasonal full time, where they receive benefits, and our company maintains a large fleet of trucks and specialized equipment, our overhead is far greater than our smaller competitors. Our economic edge is in our efficiencies of size, having everything here when we need it, being able to take advantage of discount and volume purchasing, and being able to maintain our inventory's quality over a longer period. Removing these efficiencies will eliminate our edge and Barnes will no longer be competitive.

Without an economical source of water we will not be able to sustain a retail outlet that does not have the numbers, varieties, or larger plant sizes. This inventory is what has set us apart. Our tree service and maintenance divisions are dependent on our landscape business to feed them work. The composting business is dependent on the sale of specialized soils and mulches to the retail jobs of the landscape division. The ripple effect on our company of not having our water supply would be devastating.

Prior to the current low lake levels, before construction of our project, Barnes Nursery had been able to build, grow and operate a successful horticultural operation filling economic, social and service needs of our community. Access to our water supply had enabled the company to grow in directions that others can not. We have seen increased sales over the past 20 years, diversified, and created a vertically integrated, unique service machine.

While we do not purport to be any more or less important than the other businesses that make up the fabric of the commerce and service community in north central Ohio, we do claim to be an important thread in that fabric. Barnes Nursery has taken its responsibility as an employer as its most important obligation. We provide full-time jobs with health care benefits, sick time, vacations, and profit sharing to more than 75 men and women. Our payroll in 2000 exceeded $4,000,000 which also included paychecks for over 75 seasonal high school and college students as well as skilled and critically important agricultural workers. We maintain a stable work force with most seasonal workers returning each year after a winter layoff.

In order to retain a competitive business and provide work for our employees, our product and services must maintain the highest quality. Our efforts to maintain that level of quality and service are ongoing. Because of the size of our Cleveland Road Farm and its water access, we have been able to react to various changes in the market place. In 1992, we began growing container stock when we could not obtain the numbers of plants with the quality we required to sustain our landscape contracts and meet the needs of our retail customers. We redesigned our retail sales lots and holding areas to accommodate plants, trucks and loading equipment more efficiently. We installed new underground irrigation with proper return lines. These infrastructure improvements enabled the company to maintain the quality of the inventory for a longer period of time.

With these improvements made, Barnes Nursery as a buyer, is able to take advantage of volume discounts, sales and auctions,and as a seller, dig greater volumes of trees in the spring to have adequate inventories for mid summer sales. Because of water access, Barnes has been able to expand our business niches and improve our margins.

We take our role as a contributing community member very seriously. Barnes Nursery, its owners and employees, have been involved in a variety of service and professional organizations as both leaders and participants. Harold, Bob and Sharon Barnes each served as President of the Huron Chamber of Commerce over the years. Harold and Sharon served on the Huron Board of Education, both serving as President for many years. Harold was a founder of the Huron Historical Society and Sharon currently serves as its president. Other service organizations the company and its employees have been involved with include: Rotary, Ohio State University Alumni, Erie County Chamber of Commerce, LEADS, Big Brothers Big Sisters, State Theatre, Stein Hospice, United Way, Festival of Lights, Firelands College, Firelands Hospital, Huron Schools, McBride Arboretum, Huron City Parks, and many more.

Barnes Nursery has provided support to a variety of agencies through donations of goods and services. We provide goods and services for auctions, door prizes for community fundraisers, ads for yearbooks and other community activities. We estimate the total amount to be in the tens of thousands of dollars each year.

We believe we have a responsibility as a professional horticultural company to continue to raise the bar of the nursery industry. We encourage and assist our Ohio Nursery and Landscape Association, Ohio Landscape Association, Professional Grounds Management Society (NorthEast Ohio Branch), Ohio Composting Association, U.S. Composting Council. Sharon has served as the President of both the Ohio Composting Association and more recently the U.S. Composting Council for 2 years. Barnes supported the activities of the Council in the promotion of best management practices in the composting industry. Sharon represented the national composting industry around the country, in Europe, and in Asia. Barnes Nursery has supported its industry by encouraging employees to obtain their certifications, attend meetings, and participate in trade shows, and by continually supporting best practices within the industry.

The construction of the preferred alternative of this project will allow our company to continue its operation, its commitment to our people, our community, and our industry. Without the project the fabric of the company will begin to unravel and it is difficult to say how the parts will fall. We know that without the project we would abandon our container operation. We would be forced to shut down the north hold, and the far west sales area. Those areas maintain our large trees and plants.

We would maintain far fewer large trees and most likely revert to drip irrigation on those plants. The overall effect of these changes would cause our company lose our competitive edge in our market, and the loss of work would force our company to lay off workers. Barnes Nursery would not be able to continue to work to build a more efficient company and grow our business.

Barnes Nursery was always able to obtain sufficient water from East Sandusky Bay prior to building the project. But even when lake levels were higher, wind direction became our most important weather information. Our company has always been keyed into lake levels, and predictions that levels would be declining due to the light snow pack in the winter of 1998-1999 were taken seriously. We recognized we could not wait for the time to come that we would not have sufficient water, or a sufficient delivery system. We acted prior to that happening. In April of 2000, we applied to the Army Corps of Engineers to dredge an irrigation channel across private property adjacent to the State Nature Preserve. Last year without the channel there were several weeks that it was VERY unlikely we would have had water. The only place there was ANY water in East Sandusky Bay, east of the Willow Drive, was in the our channel. The channel was able to sustain us until the wind blew water back into the Bay. According to the Corps' *Monthly Bulletin of Lake Levels for the Great Lakes* [July 2001 issue] lake levels are currently 0.5 foot lower now than the same time last year, and are likely to be lower again next year.

Please refer to 5.2.e. No practicable alternative for irrigation project for discussion of alternative economic scenarios for other designs.

5.2.i. Project will cause only short-term disturbance of water quality

As discussed above in ¶ 4. Demonstration 6, steps are now being taken to alleviate any disturbance of water quality caused by exposed sediment on the island. As the cuts are opened to form the archipelago, we plan to use the same compost procedure recommended by USEPA. Observations of construction and dredging activities along Lake Erie indicate that turbidity associated with excavations is very transitory and dissapates rapidly without lasting deleterious effects to benthic organisms. Studies by OSU's Center for Lake Erie Area Research (CLEAR) before, during, and after construction of the water intake and discharge structures at the Davis-Besse Nuclear Power Station in Ottawa County clearly demonstrate this phenomenon as well as other investigations of dredging operations (see CLEAR Technical Reports Nos. 1, 3, 5, 7, 28, 41, 172, and 181). For example, investigations of commercial dredging operations in the Maumee River estuary revealed that discernible sediment plumes did not extended more than 200 feet from operating dredges and measurable turbidity reached background values within 500 feet from the dredge. Adjacent to an operating dredge tubidity values were several times greater than ambient water values, but measurements made at the same dredge one hour after dredging ceased yielded values that had once again returned to background levels (Herdendorf, C. E. and C. L. Cooper 1975 *Environmental Impact Assessment of Commercial Sand and Gravel Dredging in Maumee River and Maumee Bay of Lake Erie*. Ohio State University, Center for Lake Erie Area Research Technical Report No. 41, 381 pp.).

By way of perspective, natural processes such as wave action on the bay bottom can introduce a much higher concentration of suspended solids into East Sandusky Bay than those associated with our project (see Figure 14 of our application). But perhaps even more noticeable is the turbidity and bottom disturbance caused by the spawning activity of common carp and other fish species in the bay. This activity was so intense this past spring, with thousands of carp congregated in East Sandusky Bay, that sinuous furrows up to 0.5 foot deep were left lacing the bay bottom north of our project site.

Once our project is completed, and the islands protected by vegetation, turbidity associated with our project will be negligible as has been the experience at many other construction sites along the Ohio shore.

5.2.j. Mitigation of wetlands

Because no wetlands occur at the project site (see 5.4.d. for Corps of Engineers determination), no compensatory mitigation is required for our project. However, approximately 5 acres of coastal wetlands will be created on former shallow, open-water bay bottom south of the hydrologic channel. The quiescent embayment afforded by our island is already fostering the spread of hydrophytic plants across the bottom. In addition, about 0.5 acre of aquatic vegetation will be encouraged on the side slopes of the hydrologic channel and the islands (see Figures 6 and 12 of our application).

5.3. Section 8 - Overall activity

5.3.a. Goal of project

The overall goal of our project is to restore the water circulation that once occurred on our property. The natural hydrology of East Sandusky Bay has been adversely impacted by several federal, state, and private projects, beginning with the construction of parallel piers through the sand bar at the mouth of the Huron River in 1827 (U.S. Army Corps of Engineers 1946 *Beach Erosion Study in the Vicinity of Huron, Ohio*. 79th Congress, 1st Session, House Document No. 220, page 11). Our project is designed to return some of this diverted water flow back to our property.

The purposes to which this returned water will be used are several. From a business standpoint, irrigation water is essential to operate our nursery. On average during the peak growing season we need 350,000 gallons of water per night for our container and up-ground plant storage areas, but this need can increase to over 600,000 gallons during, hot, dry, and windy periods in mid-summer. From a recreational and subsistence point of view, for the past five decades we have had water on our property which provided fishing, hunting, trapping, and boating opportunities that have been enjoyed by three generations of our family. Being in the plant nursery and landscaping business, often called the *Green Industry*, we are very cognizant of the natural environment and the importance of water to maintain viable wetlands. We want to continue to enjoy the wetland habitat along our bayshore property, inshore from our project site, and the aesthetic benefits that it provides. We firmly believe that our project will protect these wetlands and restore the water needed to support them. Our project will also provide the necessary environment to foster increased wetland acreage on our property and enhanced fish and wildlife resources.

Your request for information on historic uses of water for both the north and south portions of the nursery, as well as our estimate for future water needs, are discussed below in the item on 5.3.c. Historical use of water (Section 8b).

5.3.b. Clarify actual impacts (Section 8a)

The date of our original application for Ohio EPA Section 401 Water Quality Certification was May 25, 2001. As of that date, the status of construction work completed on the project (pursuant to USACOE Nationwide Permit No. 2000-02170(0) issued June 2000) was as follows:

1. a hydrologic channel approximately 1,500 feet long by 40 to 50 feet wide was excavated to a depth of about 5 feet, and
2. from the excavated material, an island approximately 1,500 feet long by 50 to 60 feet wide was constructed parallel to the north side of the channel to a height of about 5 to 6 feet.

These would be the actual physical "impacts that exist as of the date the application was submitted." Potential impacts are discussed in various other sections of this response, including 5.2.f. Appropriate and practicable steps to minimize potential adverse impacts and 5.4.d. Impacts to wildlife and wetland delineation.

5.3.c. Historical use of water (8b)

Since 1950, when Barnes Roses, Inc. was established, Barnes has used water from East Sandusky Bay for irrigation without negatively effecting that water body or surrounding ecosystem. Access to this vital water source has been critical to our company's growth over the years. Early on water flowed by gravity to a pond or an intake channel where a pump carried the water to the roses growing in the adjacent farm fields. By 1966, the challenging economic factors facing Ohio rose growers forced Barnes Roses to stop rose production and turn its fields over to shade and ornamental trees. The company changed its name to Barnes Nursery and Garden Center, Inc..

From 1966 to present, the access to water from East Sandusky Bay has allowed the company to maintain a plant inventory that feeds 10-15 landscape crews throughout the season. This access allowed our company to take advantage of volume purchasing, build a retail market since our inventories are maintained in large volumes throughout the growing season (most retail garden centers have plant traffic only in the spring and fall). We have been able to begin the development of a rewholesale center for small landscapers who have little ability to maintain inventories and do not want to travel to Cleveland to purchase plants. Our "hold lots" allow us flexibility in digging orders early as we can irrigate until the customer picks up.

In summer of 1982, Barnes installed a pond immediately east of our Garden Center and began the process of designing a more sophisticated underground irrigation system for maintaining the growing number of holding areas for the trees and plants. Underground irrigation was designed for all the landscape plant holding beds. This system was updated annually and worked sufficiently until the mid 1990's when the holding areas were no longer sufficient size for the volumes of plant material and proper plant spacing. Increasing inventories of larger sized plant material and the our expansion into container growing operation to supply the needs of our landscape department resulted in the need for our new pumping system which was installed in 1999. The system currently pumps an average of 350,000 gallons of irrigation water nightly to our container and B&B stock. Based on our current rate of expansion, notwithstanding the present economic slump, we anticipate that the capacity of our existing pumping system will be adequate for at least the next decade.

As discussed earlier, our southern fields operation (south of U.S. Route 6) utilizes drip irrigation. Here, trees and plants are grown in the ground. Small "spaghetti" lines run off a main trunk to each plant in a row. Water drips from the emitter to each individual plant. Of the 350 acres of fields with "in ground" nursery stock, about 50% is under drip irrigation using potable county water. This method this method is not practical or cost effective for container and B&B stock on our 15-acre area north of U.S. Route 6.

5.3.d. Your request to remove 23 paragraphs (¶ 2-24) of Section 8b

The information that you requested be removed from our application documents the environmental degradation that has taken place in East Sandusky Bay since construction was initiated on the Huron harbor piers in the late 1820s. We believe it is essential to our application that Ohio EPA understands what has happened to cause our water supply to be diminished. This information explains the human-induced reasons for the loss of water and presents our rational for restoring natural water circulation to our property. Thus, we feel that retaining the 23 paragraphs is of the utmost importance to our application and wish to have this information included as a demonstration of our purpose and need.

The question of mitigation is discussed in ¶ 3. Wetlands and Mud Fat Clarification, 5.2.j. Mitigation of wetlands, and 5.4. Section 10 - Wetland mitigation of this response.

5.3.e. Nearshore bathymetric surveys and references cited

Copies of nearshore bathymetric surveys conducted by the U.S. Army Corps of Engineers in 1877, 1939, and 1949 (in cooperation with ODNR, Office of Chief Engineer) are on file at ODNR, Div. of Geological Survey, Lake Erie Work Group in Sandusky, Ohio (contact Donald Guy at 419-626-4296).

We are pleased to enclose a copy of appropriate excerpts from cited references that may be difficult to obtain, However, state and federal agency documents should be readily

available to you directly from the agencies or from the State Library which is located near your office. In particular, many of the publications referenced can be obtained from ODNR, Div. of Geological Survey, Lake Erie Work Group in Sandusky, Ohio (contact Donald Guy at 419-626-4296). All of the Center for Lake Erie Area Research technical reports are available at the Biological Sciences Library on the OSU Columbus Campus (contact Bruce A. Leach at 616-292-1744).

5.3.f. Shoreline recession

Your recession statement "shoreline recession of 10-15 feet per year appears normal for Lake Erie." is false. Recent measurements by ODNR, Div. of Geological Survey, Lake Erie Work Group yielded the following recession rates for the Ohio shore:

County	Recession Rate
Lucas	2.6 ft/yr
Ottawa 1.4 ft/yr	
Erie	
Lake shore	3.3 ft/yr
Sandusky Bay	1.0 ft/yr
Lorain	0.4 ft/yr
Cuyahoga	0.2 ft/yr
Lake	1.7 ft/yr
Ashtabula	1.4 ft/yr
Entire Ohio shore	~1.5 ft/yr

Thus, your statement is an order of magnitude too high.

The point of Section 8b in our application is to demonstrate how sand starvation, which is attributable to the construction of the Huron harbor structure (see enclosed letter from Samuel W. Speck, ODNR Director to U.S. Army Corps of Engineers, January 17, 2001) has resulted in the destruction of the Cedar Point sand spit along East Sandusky Bay and thereby caused the infilling of the Black Channel—the natural source of water into East Sandusky Bay and our source of irrigation water. Our project seeks to restore a portion of this natural circulation that has been lost through governmental mismanagement of the lakeshore.

In the early part of the last century, the base of the Cedar Point sand spit was much wider and higher. Sand dunes 15 to 20 feet high were common along the barrier beach. This barrier then protected the spit from overtopping and the Black Channel from infilling. As sand was detained or forced well offshore to the east of Cedar Point, the same westward moving forces that built the spit caused sand to be depleted in the vicinity of Sawmill Creek and accrete against the jetty at the distal end of the spit. This process is continuing today. If the Huron harbor and other structures had not been built or if by-pass systems had been installed, new sand would continue to move in from the east and replenish that which moved on to the west. Thus, the base of Cedar Point would be much more stable and hundreds of feet farther lakeward than today's situation and an adequate water supply would still be available in East Sandusky Bay.

Annual average lake levels are available from NOAA Great Lakes Research Laboratory in Ann Arbor (contact Frank Quinn), Detroit District, U.S. Army Corps of Engineers, and ODNR, Div. of Geological Survey, Lake Erie Work Group in Sandusky, Ohio (419-626-4296).

5.3.g. Extraneous material

If you have concluded that the information concerning rapid shore recession is "extraneous material" that "only extends the review time for applications," then the point we were trying to demonstrate has eluded you. Avulsion of the type described by Dr. Charles Carter (1973 *The November 1972 Storm on Lake Erie*. ODNR, Div. Geological Survey Infor. Circ. 39, page 3) was the result of sand starvation caused by the Huron harbor structures. In a later publication (Carter, C.H., D.E. Guy and J.A. Fuller. 1981. *Coastal geomorphology and geology of the Ohio shore of Lake Erie*. Geol. Soc. Am. Annual Meet. Cincinnati, Field Trip Guide No. 7. p. 433-456), Dr. Carter recognized this fact and stated, "The Huron jetties, by trapping and/or modifying the net longshore transport of sand from the east to the west, have starved the shore to the west, which includes the Cedar Point spit-barrier. As sand west of the structures has been gradually but inexorably transported west

away from the structures, the shore has become subjected to greater wave energy. Man-made structures built to protect the shore have exacerbated the problem..." Thus, the point we wished to make was that the deterioration of the Cedar Point barrier beach and the subsequent loss of the Black Channel were not due to the natural course of events, but induced by ill-advised, man-made structures. If such structures had not been built there would be no need for our restoration project. Because our loss was caused by inappropiate construction, we believe we are justified in taking action to reclaim what others, not nature, have taken from us.

5.3.h. Sawmill Creek shore erosion study

The recession rate study at the base of Cedar Point sand spit (between the mouth of Sawmill Creek and the NASA pumping station) is discussed in the last paragraph of page 5 and the first two paragraphs of page 6 of our 401 Water Quality Certification application. This study involved repetitive nearshore bathymetric profiles performed in May and November 1972. The severe storm of November 13-14, 1972 resulted in an average shore recession of 25 feet along this reach of shore, and a miximun recession of 50 feet at the mouth of Sawmill Creek. This single storm was the equivalent of about 8 years normal of shore erosion for Erie County (see response 5.3.f. Shoreline recession).

Because of the massive shore protection structures that have been constructed on three sides of the NASA pumping station, no recession has occurred at this location for at least the past 40 years (see Figure 13 of our application), however, the unprotected shores east and west of the pumping station have receded at a rapid rate, particularly the barrier beach west of the station which has transgressed several hundred feet landward in the past 30 years.

5.3.i. ODNR mismanagement

We strongly believe that ODNR's actions, and lack of them, has exacerbated the water shortage problem that Barnes Nursery is currently experiencing. After owning the barrier beach for over 20 years and watching it degrade so severely in the mid-1980s, ODNR is only now calling for the Corps of Engineers to restore the barrier (see enclosed letter from Samuel W. Speck, ODNR Director to U.S. Army Corps of Engineers, January 17, 2001). It appears more than coincidental that ODNR has taken this action only after we have pointed out the cause and effect relationship between the blocking of littoral drift, the resulting sand starvation at the base of Cedar Point, and the eventual breaching and enormous transgression of the barrier bar (meeting with Lt. Colonel Glen R. DeWille, District Engineer, USACOE, Buffalo, NY, December 6, 2000).

ODNR has taken direct actions which have impacted Sheldon Marsh and which have blocked drainage from and hydrologic communication with the Sawmill Creek marshes located immediately east of Sheldon Marsh SNP. In the late 1980s, ODNR, in cooperation with NASA, widened the causeway to the pumping station, hardened the shore by placing massive amounts of stone rip-rap along both sides of the roadbed into Sheldon Marsh wetland (a linear distance of approximately 6,000 feet of stone which destroyed 3 acres of wetlands), and failed to install functioning culverts. We understand this work was undertaken without a USACOE permit or OEPA 401 Water Quality Certification. Of particular importance to Barnes Nursery is the blockage of drainage from several hundred acres of wetlands and uplands in the Sawmill Creek Resort area. Thus, we believe we are being held to a different and higher standard than federal and state agencies when they undertake construction projects along Ohio's Lake Erie coast.

The fate of the "Black Channel" can be analyzed by considering a number of factors. Classical studies of transgressing barrier bars (e.g. Johnson 1965 *Shore Processes and Shoreline Development*, Hafner Publishing Co., New York, NY) demonstrate that as a barrier bar migrates landward, the drainage channel on the inside of the bar also migrates landward to keep pace with the transgression. Figure 12 of our application illustrates this phenomenon. Johnson's 1965 diagram has been modified with labels that show the time sequence of events that have taken place at the base of Cedar Point barrier beach and what will likely happen in the future.

The Johnson sequence normally takes place over an extended period of time. Unfortunately Cedar Point has been starved of beach-building sand by the Huron Harbor structures and other shore structures farther to the east which has hastened shore recession. With very little new sand coming in from the east, the transgression process was accelerated

to the point where the Black Channel could no longer keep pace and was overrun and filled. Likewise, sand starvation resulted in the rapid recession of the shore off the present mouth of Sawmill Creek to the point where the stream debouched directly into Lake Erie rather than following through Sandusky Bay. With the loss of Sawmill Creek's flow, the Black Channel was more susceptible to infilling and was less able to adjust landward as the bar transgressed.

Statements made at the Corps of Engineers application public hearing on June 12, 2001 by several long-time residents of the area indicated that the Black Channel was in existence until the Cedar Point barrier beach was breached by storms in the 1970s and 1980s. The rapid retreat of the barrier beach at the base of Cedar Point (approximately 850 feet) during these storms destroyed much of the Black Channel between Willow Drive and Sheldon Marsh causeways.

5.3.j. Open embayment wetlands

The open waters of this East Sandusky Bay, where our project is located, lacks hydrophytic plants and therefore can not be considered as wetlands. We do not disagree that the Sheldon Marsh portion of East Sandusky Bay contains category 3 wetlands. However, Sheldon Marsh wetlands are not within our project boundaries.

Open embayments along the Ohio shore of Lake Erie do not support coastal wetlands. To demonstrate this point one only needs to tour the coast from Toledo to Conneaut to be convinced. Starting in Lucas County, the large embayment of Maumee Bay is devoid of coastal wetlands except where sand barriers and dikes provide the quiescent habitat necessary for emergent aquatic plants. Plant communities of this type simply can not survive when exposed to the open forces of the bay. Farther to the east in the embayments at the base of Little Cedar Point and at Metzger Marsh and Magee Marsh, there are no coastal wetlands lakeward of the protective dikes. In Ottawa County the only coastal wetlands occur in enclosed embayments, such as the estuaries of the Toussaint and Portage Rivers and the West, Middle, and East Harbors on Catawba Island. In Ottawa, Erie, and Sandusky counties, the largest embayment—Sandusky Bay, is also devoid of emergent coastal wetlands except where dikes protect them or where they are shielded from wave energy at the far western and eastern ends of the bay, such as portions of Muddy Creek Bay and the Sheldon Marsh portion of East Sandusky Bay. The fact that coastal wetlands only occur in protected regions of East Sandusky Bay (such as in the triangular region known as Sheldon Marsh, adjacent to the protection of the Cedar Point spit, and landward of the island at our project site) demonstrates that open embayments have coastal wetlands. Moving eastward, Volunteer Bay between Huron and Vermilion is open to the lake, but possesses no coastal wetlands except in the enclosed estuaries of Old Woman and Chappel Creeks. In Lorain and Cuyahoga counties the only embayment is a broad one from Avon Point to Lakewood. Centered on Bay Village, this open embayment does not exhibit coastal wetlands. Likewise, Lake and Ashtabula counties do not have coastal wetlands except in estuarine situations such as Mentor Marsh, Arcola Creek, and Cowles Creek near Geneva-on-the-Lake (see Herdendorf, C. E. et al. 1981 *Fish and Wildlife Resources of the Great Lakes Coastal Wetlands within the United States*. U.S. Fish and Wildlife Service, FWS/OBS-81/02 — V1: Overview & V3: Lake Erie).

Lake Erie is noted for its severe northeast and northwest storms, the resultant wave attacks at its shores, and rapid fluctuations in water level. The high energy produced by these storms precludes the development of fringing coastal wetlands in embayments open to such forces. Only where some type of natural or artificial protection is available against harsh coastal processes can marshes become established and continue to exist (Herdendorf, C. E. 1987 *The Ecology of the Coastal Marshes of Western Lake Erie: A Community Profile*. U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers, Biological Report 85(7.9), pages 122-123).

5.3.k. Discharge of dredged material

The following four subsections provide the requested information concerning the dredged material.

5.3.k.1. Amount of material removed

Approximately 13,900 cubic yards of sediment was dredged from the bottom of East Sandusky Bay to create the existing hydrologic channel. All of the material

dredged was at elevations below Ordinary High Water Mark (elevation 573.4 feet, IGLD 1985).

Material to be excavated from the existing island to create the archipelago (five new islands) will be placed on the individual islands. No excavation will be required below the pre-construction elevation of the bay bottom. This work will require the relocation of approximately 1,000 cubic yards of material.

5.3.k.2. Volume of fill

All of the material dredged to create the hydrologic channel was side cast into open water to form an island on the lakeward side of the channel. The volume of this material was approximately 13,900 cubic yards.

5.3.k.3. Quality of fill

The material dredged from the bottom of East Sandusky Bay consists of surfical marsh sediment (fluvaquents) underlain by glaciolacustrine deposits (Redmond, C. E. et al. 1971 *Soils Survey of Erie County, Ohio.* USDA, Soil Conservation Service; Martin, N. H and S. T. Prebonic 1994 *The Soils of Erie County, Ohio.* ODNR, Division of Soil and Water Conservation; Carter, C. H. and D. E. Guy 1980 *Lake Erie Erosion and Flooding, Erie and Sandusky Counties, Ohio.* ODNR, Div. of Geological Survey). The marsh sediment is similar to the lower portion of Lenawee soil — a yellowish-brown, silty clay loam that is firm and massive. The glaciolacustrine clay deposits consist largely of interlaminated silt and clay. The laminations are brown and the clay laminations are dark gray brown. The marsh sediment appears to be derived from glaciolacustrine parent material.

Some peaty deposits were also dredged to form the hydrologic channel. The 1987 aerial photograph (Figure 14 of our application), clearly shows waves entering the interior of the bay and eroding fine-grained silty and peaty sediments (note the dark organic sediments being exhumed by the waves), which was carried into the bay. As a consequence the Black Channel was either over run or filled with sediment. The results of this process can be seen in Figure 5 of our application and in aerial photograph No. 347 of March 14, 2001 (sent to you with copy of ODNR consistency responses, July 2, 2001). A series of five, black peaty sediment patches occur along the length of the side-cast island north of the hydrologic channel. These represent former waterways that were part of the Black Channel system. They may represent a sinuous east-west channel, or more likely small tributaries flowing into the Black Channel from the south. The latter possibility is supported by dark lineaments in the soils, south of the hydrologic channel, which line up with the patches on the island. The positions of the former channels through the island correspond to where we propose to place the new cuts to improve water circulation.

5.3.k.4. Feeder channel

The feeder channel will be roughly triangular in shape, 500 feet long, 3 feet wide and 1.5 feet deep. Creating a channel of these dimensions by pulling a single-blade plow through the bay sediments will require approximately 42 cubic yards of material to be pushed aside and compacted at the channel's margins.

5.4. Section 10 - Wetland mitigation

As pointed out earlier, no wetlands occur at the project site (see 5.4.d. for Corps of Engineers determination), thus no compensatory mitigation is required for our project. However, approximately 5 acres of coastal wetlands will be created on the former, shallow, open-water bay bottom south of the hydrologic channel. The quiescent embayment afforded by our islands is already fostering the spread of hydrophytic plants across the bottom. In addition about 0.5 acre of aquatic vegetation will be encouraged on the side slopes of the hydrologic channel and the islands (see Figures 6 and 12 of our application).

5.4.a. Depth of channel

The general elevation of the flat bottom of East Sandusky Bay is +1.5 feet LWD and slightly shallower, about +1.6 feet LWD, at the project site. The hydrologic channel was dredged to a nominal depth of 5 feet, thus the bottom of the channel is about 5 feet below the general bottom of bay, not "2.7 feet deeper than East Sandusky Bay" as indicated in your letter. Because the natural sill (formed on the bay side of our project by the slight shadowing of the bay toward the land) is about 0.1 foot higher than the offshore bottom of

the bay, water retained in the hydrologic channel will be about 0.1 foot above the dry bay bottom when water levels in the lake drop below +1.5 feet LWD. Thus, the last paragraph on page 10 of our application is correct as stated.

5.4.b. Non degradation alternative

As discussed above in 5.2.b. Non degradation alternative, we believe that restoring the site to pre-construction conditions would not be in the best interest of our nursery business or the environment of the south shore of East Sandusky Bay. Filling in the existing hydrologic channel would not only eliminate an essential water source for our nursery, but exacerbate an already critical water shortage situation in the bay. Our project site is well on the way to stabilizing conditions along the south shore. Wetland plants are beginning to spread across the once barren embayments. During the many days in which East Sandusky Bay was dry this spring, our hydrologic channel furnished the only refugia for fish, amphibian reptilian, and avian species. To destroy this channel and remove the protective island would certainly cause more adverse environmental impacts than to let them exist and function to continue to enhance the environment of our property and the surrounding area. Thus, our position is that because no degradation can be demonstrated from our project as it now exists, its present configuration would constitute a non degradation alternative.

5.4.c. Detailed description of proposed construction work

To complete the project, the following construction work is proposed that will require work in of near the surface water of East Sandusky Bay:

1. modify the single island into 5 separate islands by cutting circulation channels approximately every 300 feet, which will result in 6 water passages through the archipelago,
2. grade the top surface of the islands to a relatively uniform elevation about 6 feet high and grade the side slopes of the islands to a 4-to-1 slope (run to rise), and
3. excavate a narrow, feeder channel (500 feet long, 2 to 3 feet wide, and 1 to 2 feet deep) between the natural channel (shown on Figure 5 of our application) and the existing hydrologic channel.

Segmenting the existing island into 5 separate islands, averaging about 300 feet long, will be accomplished by using a mechanical excavator. The excavations will not exceed the pre-construction depths of the East Sandusky Bay bottom. Material removed from between the islands will be placed on the islands and not into the surface water. The final grading to the specifications shown on Figures 6 and 7 of our application will be done with a bulldozer or other grading equipment. To retard excess turbidity and sedimentation during the excavation and grading activities, a compost mound will be placed at the waters edge and on other exposed surfaces that could be susceptible to erosion and gullying. This application is recommended by USEPA (see document EPA530-F-97-043, October 1997). This work will require 2 to 3 days to complete.

The feeder channel will be created by pulling a steel sediment plow between the natural channel and the existing hydrologic channel. The plow will be positioned at the southeastern end of the natural channel from a shallow-draft raft. The sediment plow will be connected by a cable to a mobile winch positioned on the distal end of the westernmost island. By sliding the plow through the sediment a furrow will be created as the sediment compacts along the margins. This will be accomplished in a single pass of the plow and require 1 day to complete.

5.4.d. Impacts to wildlife and wetland delineation

Impacts to Wildlife. Our project has converted shallow-water bay bottom into a deep-water habitat and a linear island approximately 1,500 feet long. The alternating submerged and desiccated conditions that have occurred at our project site in recent years is not conducive to the aquatic invertebrates that typically inhabited the bay bottom under its normal water level regime.

Our project will benefit many forms of wildlife, including nongame and endangered species. Our objective is not focused on waterfowl species, rather our intent is to create diverse habitat on a series of islands and a deep-water channel. We have observed numerous Canada goose nests on the barrier beach of Sheldon Marsh State Nature Preserve and the NASA breakwall, and we do not wish to replicate this problem at our site.

By specifying "avifauna habitat" our intention is to create a diverse habitat of aquatic plant zones on the inside slope of the islands, upland shrubs and trees on the crest, and beach flora on the bay side. In this way we will be attracting a diverse community of birds to the islands and minimize unwanted species such as herring and ring-billed gulls and the Canada goose. We have already observed bald eagles (*Haliaeetus leucocephaus*), tundra swans (*Cygnus columbianus*), mallards (*Anas platyrhynchos*), great egrets (*Ardea albus*), and great blue herons (*Ardea herodias*) utilizing the island and hydrologic channel. Mammalian wildlife populations have also benefited from the project. The island appears to be a preferred habitat for mink (*Mustela vison*). Numerous mink dens have been found near the crest of the island. Here, the recently disturbed soil is easily burrowed into by these mustelids. Tracts of the white-tailed deer (*Odocoileus virginianus*) are also common on the island.

Figure 12 of our application illustrates our concept of how the islands will appear once we have established native vegetation. As a comprehensive plant nursery, Barnes Nursery, Inc. has the labor, equipment, plant stock, and access to appropriate technical resources to convert this concept into reality. In developing our highly-praised composting operation, we worked with the U.S. Department of Agriculture (USDA), National Wildlife Research Center (located at the NASA facility in Erie County, Ohio) to successfully minimize the aggregation of unwanted bird species. Plans are now being formulated to conduct research on our islands to insure that a similar result is obtained.

The USDA center has recommended that we request a permit for nest removal and egg destruction for unwanted bird species on the islands: herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), double-crested cormorant, (*Phalacrocorax auritus*), and Canada goose (*Branta canadensis*). This program would involve weekly monitoring by qualified biologists to insure that proper control measures are taken on the target species. With the approval of wildlife management agencies this program will prevent undesirable bird species from establishing nesting colonies on the islands. Barnes Nursery is prepared to undertake this program in conjunction with USDA.

Recent studies show that Lake Erie coastal wetlands function as important fish habitat by exporting large quantities of fish, first to avian, piscine, and mammalian food chains through predation, and second to the lake as young-of-the-year sport and forage fish (Jude and Pappas 1992 *Fish Utilization of Great Lakes Coastal Wetlands*. Journal of Great Lakes Research 18(4):651-672). The researchers concluded that: (1) a wetland must be connected with the lake to promote and enhance efficient fish utilization of the high productivity of marshes, (2) additional resilience is provided to species which spawn in wetlands since they can produce two cohorts (one in wetlands and one in the lake), and (3) circulation initiated by fluctuating water levels is important in sustaining habitat diversity and productivity. Our deep water habitat will meet all three of these criteria. In addition, Figure 12 of our application clearly shows our intent to foster the establishment of submersed aquatic vegetation beds along the sides of the channel. Such beds have not occupied the bay bottom since the disappearance of the Black Channel.

Our project will help maintain and improve Lake Erie fisheries in several ways. First, it will create additional coastal marshes and will enhance water circulation to them. Second, it will provide a deep-water refugia for wetland fish species that would normally be stranded during low water level events when East Sandusky Bay is dewatered or frozen when the bay freezes to the bottom in winter. Third, it will provide a direct conduit for fish to move between the lake and coastal marshes.

East Sandusky Bay can serve as habitat for a robust fish population. Research by Professor David Johnson of Ohio State University (1989 *Lake Erie Wetlands: Fisheries Considerations*, in K. A. Krieger, ed., *Lake Erie Estuarine Systems: Issues, Resources, Status, and Management*, NOAA, Estuarine Program Office, Washington, DC, p. 257-274) shows that a diverse group of 46 species utilize Lake Erie coastal marshes, most of which are abundant or common—including: bigmouth buffalo (*Ictiobus cyprinellus*), quillback carpsucker (*Carpiodes cyprinus*), shorthead redhorse (*Moxostoma macrolepidotum*), white sucker (*Catostomus commersoni*), crappie (*Pomoxis* spp.), bluegill sunfish (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), pumpkinseed (*Lepomis gibbosus*), rock bass (*Ambloplites rupestris*), gizzard shad (*Dorosoma cepedianum*), carp (*Cyprinus carpio*), emerald shiner (*Notropis atherinoides*), spottail shiner (*Notropis hudsonius*), grass pickerel (*Esox americanus*), black bullhead (*Ameiurus melas*), yellow bullhead (*Ameiurus*

natalis), brown bullhead (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctatus*), white perch (*Morone americana*), white bass (*Morone chrysops*), yellow perch (*Perca flavescens*), and freshwater drum (*Aplodinotus grunniens*). This diversity can be expected in the deep water channel and adjacent coastal wetlands of East Sandusky Bay.

Wetland Delineation. Corps of Engineers' biologists have conducted several investigations of our project site. These surveys took place in April, June, and September 2000 and in May and June 2001. In each instance, the Corps' biologists concluded that the site lacked any hydrophytic plants and therefore did not constitute a wetland. We have made several inquires to the Corps in regard to this question and each time we have been advised that no wetland deliniation is necessary for the site because no wetlands are present (personal communications: Michael G. Montone, USACOE, Buffalo District Office, July 13, 2001 and Gary Buck, Oak Harbor Office, July 16, 2001).

5.4.e. Intake channel

In our application, we stated, "In 1999 it was determined that by creating a wider intake channel (approved by Corps of Engineers on a prior use basis) and installing a new pumping system Barnes Nursery could eliminate many costly inefficiencies in its irrigation practices and create a quieter, cleaner, and more environmentally appropriate system." You asked us to explain "approved by Corps of Engineers on a prior use basis." For over 50 years Barnes Nursery has withdrawn water from East Sandusky Bay for irrigation purposes. We have utilized various pumps and water intake designs over the years. Anticipating the need to widen the intake channel in 1990, we contacted the Corps of Engineers for advice. An investigation was conducted at that time by Douglas Brewer of the Corps' Bowling Green Office. He concluded that we could proceed with the planned improvements. No permit was required because of our long-term, established use of an intake channel at the site. He also advised that annual maintenance work and minor improvements could be made as necessary, such those completed in 1999 (personal communication: Gary Buck, USACOE, Oak Harbor Office, July 16, 2001).

5.5. Public water supply

5.5.a. Cost of water per night

Although we recover up to 60% of the water used nightly for overhead irrigation of our container and B&B areas, we still have to apply an average of 350,000 gallons each night. To calculate our costs for this water, we used the information presented in the comparison table in item 5.2.e. No practicable alternative for irrigation project. At approximately $30,000 per year for our costs and watering for about 180 days, the average nightly cost would be $167 or about 0.05 cents per gallon.

5.5.b. Southern fields

As pointed out in item 5.3.c. Historical use of water (8b), our southern fields operation (south of U.S. Route 6 and north of Bogart Road on the east and west sides of Camp Road) utilizes drip irrigation. Here, trees and plants are grown in the ground. Small "spaghetti" lines run off a main trunk to each plant in a row. Water drips from the emitter to each individual plant. Of the 350 acres of fields with "in ground" nursery stock, about 50% is under drip irrigation using potable county water. Because of the low volumes of water used for drip irrigation, no de-chlorination is needed. The average yearly irrigation requirement for our southern fields is approximately 500,000 cubic feet of water at an annual cost of $12,000. This equates to about 3.14 cents per gallon.

5.5.c. Groundwater wells and pond

In July 1981, Tibboles Well Drilling, Inc. of Bellevue, Ohio, drilled three well on the Barnes Nursery property for the purpose of obtaining irrigation water (see attached invoice which describes the work performed). The intent was to fill the pond with well water, then pump water from the pond to the container and B&B areas. The wells were located on the north side of U.S. Route 6, in the general vicinity of the existing pond, 200 to 500 feet to the northeast of the Garden Center. All three wells were dry holes, as indicated on the invoice. Well no. 1 was drilled to 125 feet, well no. 2 to 50 feet, and well no. 3 to 50 feet. Complete well logs were filed with and are available from ODNR, Div. of Water. Publications of the Div. of Water confirm that groundwater resources in the vicinity of Barnes Nursery are very scarce, with anticipated yields of only a few gallons per minute (Walker, A. C. 1986 *Ground-water Resources of Erie County*. ODNR, Div. of Water, Columbus, OH. 1 map).

Dr. D. Z. Haman (2001 *Principles of Irrigation Management: Water Management Guideline for Nursery/Floral Producers*. American Small Farm 10(7):22-24) points out that drainage ponds are not desirable sources of irrigation water because of the possibility of disease organisms and weed seed being distributed over the plants, and because of algae and other organisms developing which clog the irrigation system.

Thus, given the above information, well and pond water are not viable alternative to supply our irrigation water needs.

5.5.d. Recycled water

The entire container and "balled & burlapped" areas of our nursery are underlain with porous crushed rock and a tile system that carries irrigation water and storm water back to the intake channel adjacent to the pump station for recycling. Return water continually discharges into the intake channel from two, 6-inch corrugated tiles. We estimate that up to 60% of the water applied to the plants each night is returned to the intake channel the following day. No chemical additives of any type are added to the overhead irrigation system.

5.5.e. Purchasing Erie County water

The enclosed correspondence from Erie County Environmental Services (May 23, 2001) delineates the costs of installing and then paying for county water. An expenditure of $420,000 would actually equate to $1,216, 589. at 9% over the 30 years of a loan. That would be an additional $40,553 per year for 30 years along with the cost of purchasing the water. Erie County Environmental Services has estimated the cost of purchasing 350,000 gallons per day would cost $47,000 per month in 2002 and $53,340 per month in 2003. As shown in the table in item 5.2.e. No practicable alternative for irrigation project, we calculated our water needs for a 6-month period (May-October), however, we have experienced warm and dry weather in April and November when irrigation has been required.

Barnes Nursery does not consider purchasing Erie County water practicable. Given the modest profit margin for our company, we would be unable to continue the business as currently operated with these additional operating costs.

5.5.f. NASA pumping station

We have investigated this option from a cost standpoint. Aside from the technical and governmental problems associated with this project pointed out in your letter, as shown in the table in item 5.2.e. No practicable alternative for irrigation project, the costs are far too great to justify this option.

5.5.g. Directional boring

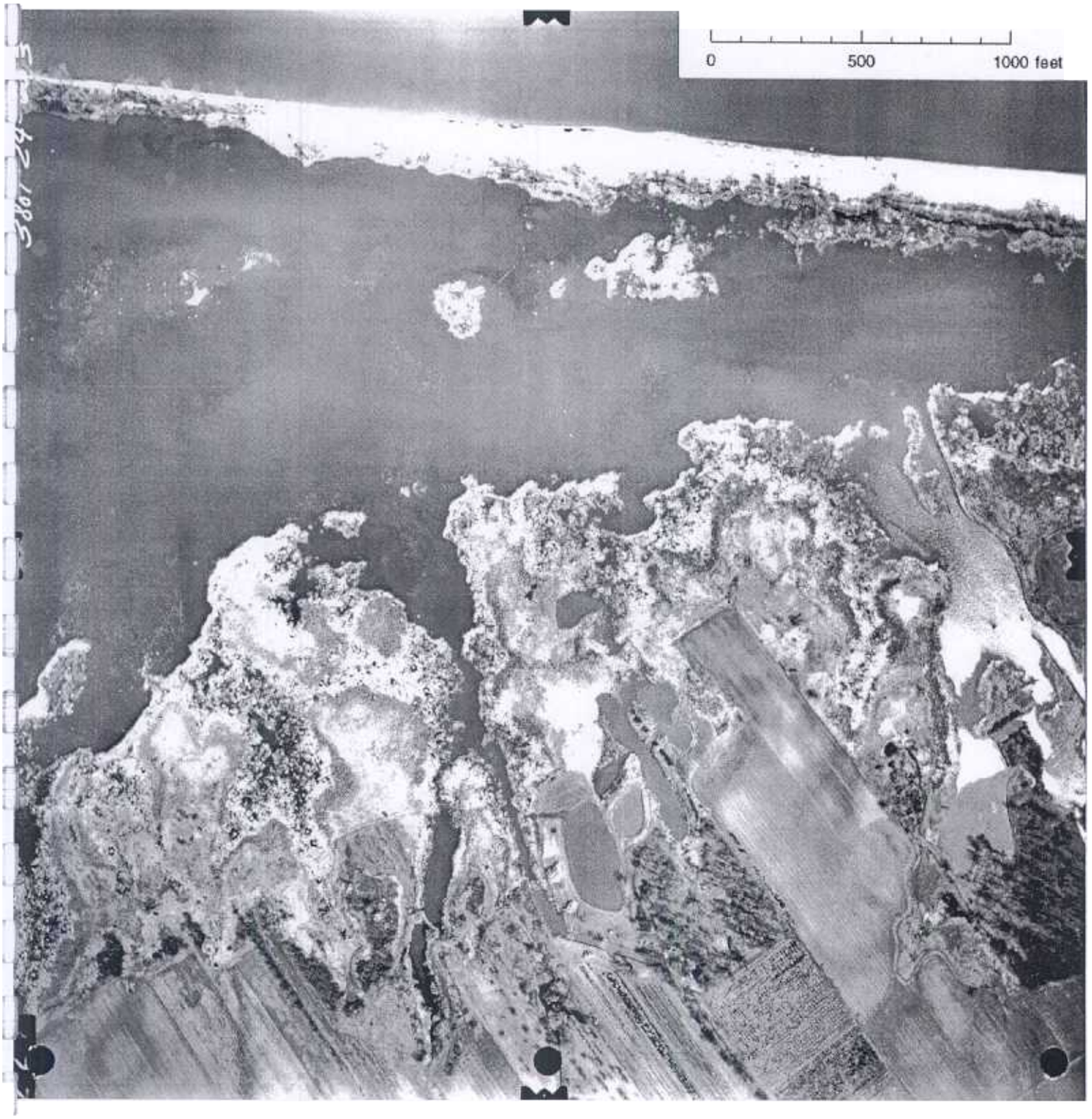
In June 2001, Barnes Nursery contacted Speer Bros., Inc., a Sandusky, Ohio construction firm specializing in directional boring, to explore the possibilities of boring under the East Sandusky Bay bottom and/or the Willow Drive causeway to obtain irrigation water. The directional boring contractor felt that it would be very difficult to bore underwater to place the pipe due to the stone reinforcement and road foundation that most likely makes causeway. The contractor indicated that it is very important when boring or laying pipe there is very little variation in the slope of the pipe. The engineering and testing needs be done prior to beginning a project to lay 7000 feet of pipe with the bends avoid ODNR property present other unknown costs to the project. Given all of the difficulties and uncertainties in this approach, a cost in excess of $1,000,000 was estimated. Thus, the costs are too great to justify further consideration of this option.

Thank your for the opportunity to respond to your questions. Please contact me if you require any additional information.

Sincerely,

Robert W. Barnes
President

cc: Michael G. Montone, Buffalo District, Corps of Engineers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